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Rational Design and Synthesis of Unsaturated Se-Containing Osmacycles with σ-Aromaticity


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Invited for the cover of this issue are the groups of Haiping Xia and Jun Zhu at the University of Xiamen. The image depicts their discovery of metallacyles with σ-aromaticity dominating in an unsaturated Se-containing ring. Read the full text of the article at 10.1002/chem.201703870.

What is the most significant result of this study?

σ-Aromaticity has been traditionally observed in saturated rings, and examples with σ-aromaticity dominating in an unsaturated ring were particularly rare. In this contribution, we report a combined theoretical and experimental study on the design and synthesis of osmapentaloselenirenes, demonstrating the first example of σ-aromaticity dominating in an unsaturated Se-containing ring. Our findings widen the scope of σ-aromaticity and encourage further efforts to realize novel σ-aromatic unsaturated systems.

What was the inspiration for the cover design?

The discovery of σ-aromaticity dominating in an unsaturated Se-containing ring is a significant advance in the chemistry of σ-aromaticity. Thus we compare a steel cage broken by osmapentaloselenirene in the cover to a breakthrough in σ-aromaticity.

What other topics are you working on at the moment?

At the moment, the research interest of the Xia group focuses on a series of novel chelates exclusively binding to carbon atoms, which contain three-to-five metal–carbon bonds and aromatic frameworks with 7 to 12 carbon atoms. These carbon-based polydentate chelates are termed as "carbolong complexes". Numerous fascinating findings, including novel reactivity and unique properties, were obtained from these "carbolong complexes". Besides σ-aromaticity, the Zhu group has been devoted to other unconventional aromaticities in organic and organometallic chemistry, including triplet-state aromaticity, hyperconjugative aromaticity, and Möbius aromaticity.

What future opportunities do you see (in the light of the results presented in this paper)?

σ-Aromaticity in unsaturated systems has been observed recently in several species, but all the studies are limited to three-membered rings. Thus, exploring σ-aromaticity in larger unsaturated rings will be the next issue on the to-do list.